

Bone in Layer 1 represented sheep, rabbit, lizard and the following native mammals, names and classification following Ride (1970):—Boodie (*Bettongia lesueur*), Common Ringtail (*Pseudocheirus peregrinus*), Brush Possum (*Trichosurus vulpecula*), two small carnivorous marsupials (*Antechinus* cf. *A. flavipes* and *Sminthopsis* sp.), and Blunt-faced Rat (*Pseudomys shortridgei*), together with a small murid, probably the Ashy-grey Mouse (*Pseudomys albocinereus*) and a larger murid, a species of *Rattus* which might or might not be native.

Bone in Layer 2 represented Common Ringtail, Quenda (*Isoodon obesulus*), the same two species of small, carnivorous marsupials as in Layer 1, Ashy-grey Mouse, probably Blunt-faced Rat, a species of *Rattus*, and lizard.

A quartz flake of freshly broken appearance, about 1 cm long, was found in Layer 1 at a depth of 13 cm, and a similar one in Layer 2 at 30 cm. These appear to be struck flakes.

DISCUSSION AND CONCLUSIONS

The small quartz flakes suggest that Aborigines used the cave, though probably not since the area was cleared for farming about 1900-1905. The mammals found were predominantly native, which also suggests early, perhaps prehistoric use of the cave if the mammal remains represent human food. Residents of long standing in the district inform me that various native mammals persisted long after European occupation, until the arrival of foxes about 1920. Among these were Boodies, Dalgies (*Macrotis lagotis*), Water Rats (*Hydromys chrysogaster*) and Quokkas (*Setonix brachyurus*) locally known as Bunk-ups, which lived among rushes along the banks of Gingin Brook and on islands in the brook. A few native mammals, such as Brush Possums and Echidnas (*Tachyglossus aculeatus*) are still seen occasionally. It is possible that the mammal remains excavated were taken there by some predator, in quite recent times.

This cave may merit further study, in spite of possible stratigraphic disturbance by rabbits or other burrowers. It is possible that it contains human occupational debris. Plant, insect and mammal remains might throw some light on climatic changes, and there is an abundance of charcoal for dating.

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AVIAN BATHING BEHAVIOUR

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There is little available information on the amount of time or the frequency with which wild birds indulge in bathing and other maintenance behaviour. The small amount of present knowledge is derived mainly from aviary studies or contrived situations.

A good example of the latter is the note by Stranger (1970) on White-backed Swallows, *Cheramoeca leucosternum*, presumably bathing in the

spray from a lawn sprinkler. The response of birds to artificial water sources are varied, and certainly many birds bathe on the ground under such sprays. It is much more difficult, however, to determine whether a bird in flight is actually bathing. I have frequently observed Grey-crowned Babblers, *Pomatostomus temporalis*, near Meandarra, Queensland, bathing in lawn sprinklers. Normally, their exposure to the water is in mid-air during short but frequent flights of three to four metres through the spray. Stranger (*op. cit.*) states that aerial bathing appears to be unrecorded from wild birds. But aerial bathing by American Ravens, *Corvus corax*, in an irrigation system in California has been recorded (Jaeger, 1963). I have not searched the British literature extensively, but suspect that such observations are indeed rare.

Strongly aerial species usually bathe by plunging into standing water, regaining flight before all momentum is lost. This is the common method of swallows and swifts (Slessers, 1970), and has been recorded for Frigate Birds, *Fregata magnificens* (Kielhorn, Norris, and Evans, 1963). Many flycatchers and other birds modify the method, sallying from a perch, plunging, and returning to the perch. I have seen this used by the Pale Yellow Robin, *Eopsaltria capito*, in southern Queensland. It is also commonly used by many honeyeaters (Haines, 1944; Immelmann, 1961; Binns, 1963).

How does bathing by birds in artificial sprays relate to natural conditions? In many species, even in some that do not normally bathe in rain, bathing is stimulated by rainfall: Cathartidae (McKelvey, 1965), Columbidae (Harrison, 1961; Ruthke, 1963; Goodwin, 1967), Picidae and Sittidae (Slessers, 1970), Alaudidae (Delius, 1969), Fringillidae (Dow, 1968). However, I know of no record of a flying bird bathing in rain. It would be difficult to differentiate such behaviour from simple drying movements (see Simmons, 1964).

A final type of bathing, usually called dew- or leaf-bathing, is not uncommon (Dow, 1968). Some birds perform normal bathing motions in wet foliage. I have previously suggested that such behaviour is a response to incidental stimulation through contact with foliage while foraging. Further observations support this hypothesis, and I have noted that leaf-bathing often is initiated by a rain-shower. Wild Noisy Miners, *Myzantha melanocephala*, often alternate between leaf-bathing and foraging during light rain. If sprinkled with water, captive Noisy and White-rumped Miners, *M. flavigula*, in my aviaries at Brisbane invariably bathe on wet foliage, in a standing pool, or both. Quite frequently wild miners are stimulated by the leaf-bathing of others until large assemblages are involved. Such social facilitation, often interspecific, has been recorded among American (Verbeek, 1962) as well as Australian birds (Officer, 1961). I have observed a group of five Australian Crows, *Corvus orru*, leaf-bathing on wet foliage after a mid-afternoon rainstorm at Brisbane in January 1970, and a flock of nine Singing Starlings, *Aplonis cantoroides*, leaf-bathing during heavy afternoon rain at Port Moresby, T.P.N.G., in August 1970.

Perhaps this more unorthodox type of bathing is actually more common among populations of Australian birds in regions where standing water is scarce, or perhaps is characteristic of more tropical species. It has been suggested by some observers that it may be induced by drought (Officer, 1961; Verbeek, 1962; Dow, 1968). Certainly there is a paucity of information on the relative occurrence of different methods of bathing used by Australian species living in different habitats and climatic conditions. The field is open for comparative studies of even our most common birds.

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BREEDING OF A LITTLE EAGLE IN THE DARLING RANGE

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The Little Eagle, *Hieraaetus morphnoides*, was not admitted as a local species by W. B. Alexander (*Emu*, 20, 1921:149) in his review of the birds of the Swan River district. Serventy (*Emu*, 47, 1948:270) in his later account of the birds of the same area regarded the Little Eagle as rare in the Perth metropolitan area although "the species occurs eastward in the Darling Range country to within 40 miles of Perth." More recently, Serventy and Whittell (*Birds of Western Australia*, 4th Edition, 1967, p. 161) state that it is frequently seen at Gooseberry Hill but still conclude that "it is more a denizen of the drier areas than of the forested South-West country."

My observations since 1963 in the Jarrah, *Eucalyptus marginata*, and Marri, *E. calophylla*, forest between Mundaring Weir and the western edge of the Darling Scarp show that the Little Eagle is the most frequently recorded large raptore, breeds, and is present throughout the year.

The Little Eagle is fairly adept at hunting in the Jarrah forest. Birds soar about 50-80 m. above the tree-tops and after sighting their prey drop, usually by several stages, almost vertically. Plummeting aerial displays accompanied by loud calling are often recorded between September and December.

On October 18, 1963, I heard a Little Eagle calling on a heavily forested ridge north of Hackett Gully creek and about 3 km. north-east of Bickley. Investigating, I discovered a large nest of twigs 20 m. above ground in a leaning Marri. An adult bird was feeding young on the nest. There was no trace of bones beneath the nest and the only evidence on the ground of the nest above were splashes of white excreta. The nesting tree was only 200 m. west of the nearest house, which was occupied only occasionally at weekends. A horizontal branch 7 m. long and 2 m. from the ground used as a food preparation platform was 60 m. east of the nesting tree. Tufts of rabbit fur were adhering to the branch and many more had been scattered by the wind.